National Aeronautics and Space Administration

Interacting Galaxy NGC 7714

Signs of a Galactic Encounter

In this Hubble Space Telescope image, the tangled shape of the spiral galaxy NGC 7714 provides evidence of a dramatic encounter with another galaxy.

Several features indicate a dynamic history. Perhaps most prominent is the ring-like structure that arcs around the left side of the galaxy. This golden loop, composed of older, intermediate-mass stars (like our sun) appears to extend into a faint tail stretching off to the right.

The galaxy also includes two bright blue tails where vibrant star formation is occurring. One blue tail is below the galaxy's center and leads toward the right; the other is above the center and leads off the image to the left.

Following that upper tail leads to the explanation for the distorted structures. The tail becomes part of a bridge of material connecting to the smaller galaxy, NGC 7715 (see inset image). By studying their shapes and star formation, astronomers have deduced that the two galaxies swung closely past each other about 100 million to 200 million years ago. Together, the odd-looking pair of galaxies is called Arp 284, after their catalog number in Halton Arp's *Atlas of Peculiar Galaxies*.

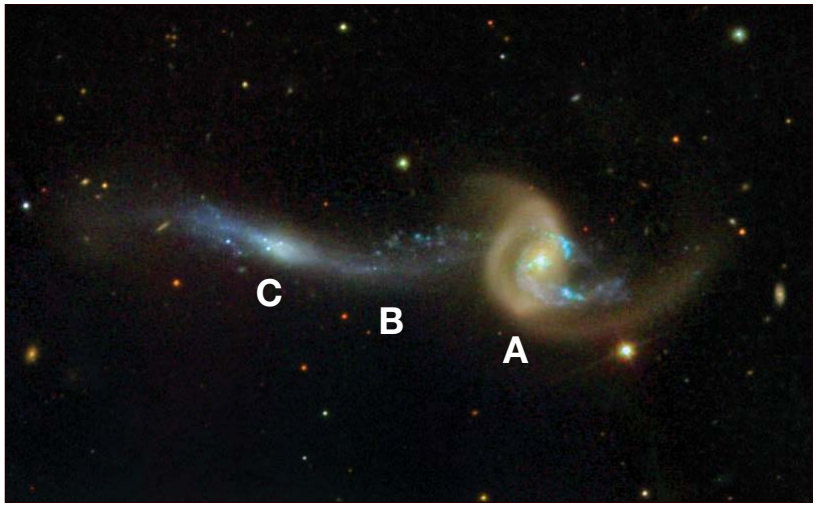
The universe contains many examples of galaxies that are stretched, pulled, and distorted in gravitational tug-of-wars between bypassing galaxies. Such close encounters also can compress interstellar gas clouds to spark intense star formation, as seen in the blue tails.

In NGC 7714, that star formation has formed an unusually large number of a rare type of star, called a Wolf-Rayet star. These very massive stars, nearing the end of their relatively short lives, are emitting strong winds that expel their outer layers into space.

NGC 7714 resides approximately 100 million light-years from Earth, in the constellation Pisces. Other objects in the image are much nearer or much farther away. The bright object just below center is a nearby star within our own galaxy. While some of the background galaxies show spiral forms, many resemble faint smudges of light. These galaxies can be up to tens to hundreds of times more distant than NGC 7714.

Credit: NASA, ESA

Acknowledgement: A. Gal-Yam (Weizmann Institute of Science, Rehovot, Israel)



A Tale of Two Galaxies

The two galaxies that make up Arp 284 are shown in this wide view, taken by a ground-based telescope. The large galaxy with the distorted spiral shape is NGC 7714 (**A**). A faint bridge of stars and wispy material (**B**) connects NGC 7714 with its partner, NGC 7715 (**C**). The distorted shapes and the bridge are evidence of a gravitational encounter between NGC 7714 and NGC 7715. The encounter also produced a flurry of star birth, which can be seen in the strings of young, blue stars in NGC 7714.

Credit: Sloan Digital Sky Survey

VOCABULARY

Galaxy: A collection of stars, gas, and dust bound together by gravity. The smallest galaxies may contain only a few hundred thousand stars, while the largest galaxies have thousands of billions of stars. The Milky Way galaxy contains our solar system. Galaxies are classified or grouped by their shape. Round or oval galaxies are elliptical galaxies, and those showing a pinwheel structure are spiral galaxies. All others are called irregular because they do not resemble elliptical or spiral galaxies.

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